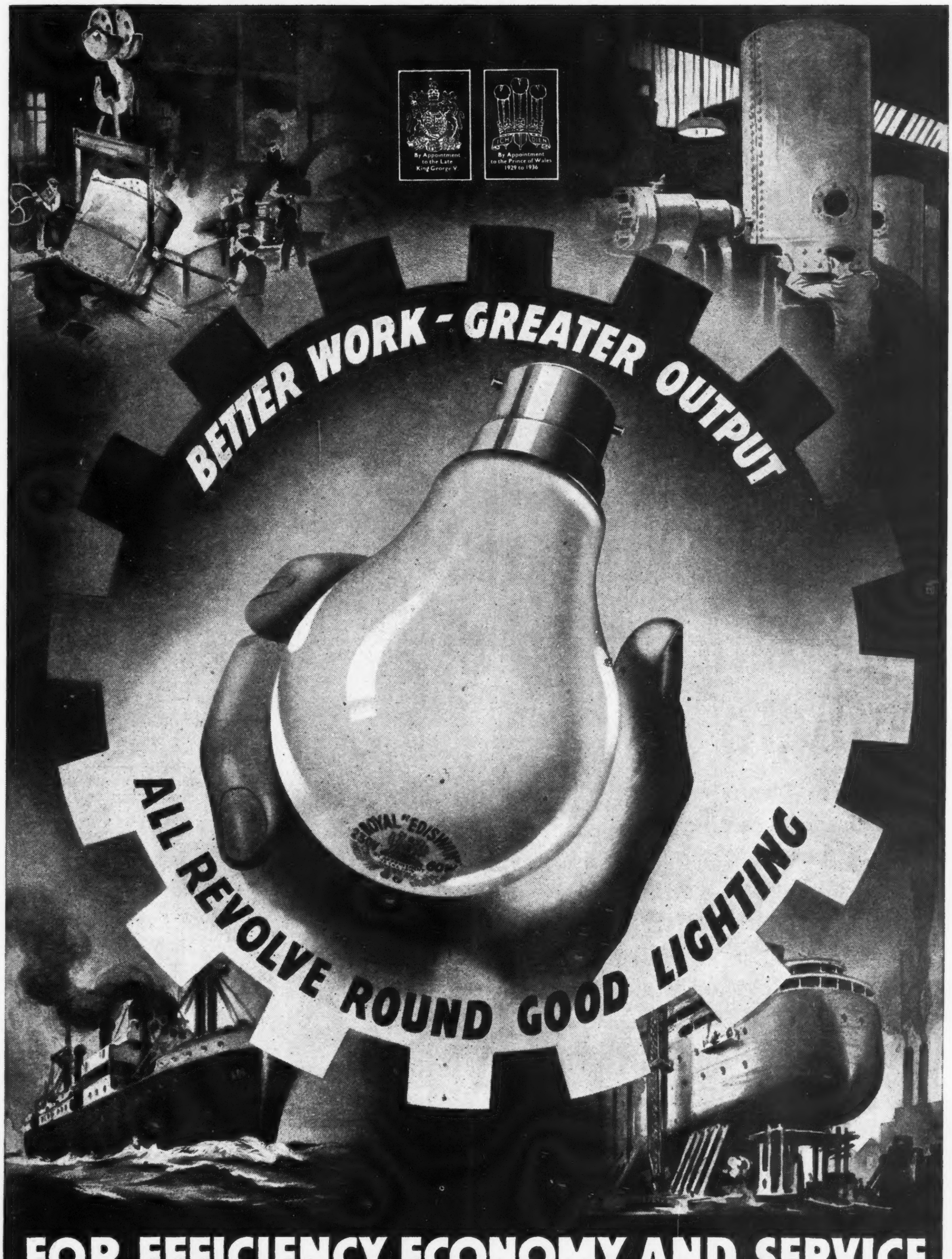
Light *and* Lighting

XXXIV.—No. 12 | December, 1941 | Price 9d.

INCORPORATING "THE ILLUMINATING ENGINEER"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Light and Lighting

Official Journal of the Illuminating Engineering Society.

32, Victoria St., London, S.W.1.

Edited by J. STEWART DOW

Telephone: ABBey 5215

Vol. XXXIV.—No. 12

December, 1941

PRICE NINEPENCE
Subscription 10/6 per annum, post free

Principal Contents:

Exploring the Infra-Red

LIGHTING Engineers are primarily concerned with Visible Radiation—a minute but important portion of the whole. Their attention has, however, recently been directed to the adjacent Ultra-Violet, which is responsible for the wonders of fluorescence (as exemplified in the latest form of "daylight" fluorescent tubular lamp) and which may produce chemical or structural changes in the material exposed to it.

On the other side is the Infra-Red, a troublesome by-product so far as lighting is concerned but a wonderful heating and drying agent, as Mr. Maxted in his recent I.E.S. paper (see p. 172) showed.

It is singular and fortunate that the visible spectrum's closest neighbour on this other side, the near infra-red, which is produced efficiently by the filament lamp, appears to be best adapted for these processes.

Infra-Red and Ultra-Violet rays have other applications, *e.g.*, for medical treatment. But it is interesting to note that these and all the other effects mentioned above depend on the *absorption* of the radiation by the material, and that such absorption is found mainly within a narrow range of wavelength on either side of the visible spectrum.

Outside this region, in either direction, is found increasing penetration. Beyond the Ultra-Violet there are X-Rays, Gamma-Rays, and Cosmic Rays. Beyond the Infra-Red there are Radio and Electric waves. Between there are gaps, stretches of radiation of whose properties we know little, though they may prove to have new and interesting applications, unsuspected by us as yet.

More I.E.S. Groups

Following the notes in our last issue on the activities of I.E.S. Centres and Groups, it is of interest to record further progress in other areas. In the West of England, where ultimately a new centre should be created, there are at present activities in two main areas, in Bath and Bristol, where Mr. R. E. Tucker and Mr. D. J. Sawkins are respectively acting as honorary secretaries and are doing excellent work. In Bath, where a substantial increase in membership is recorded, an application to form a new group has been accepted by the Council, and congratulations were addressed, conveyed by Mr. R. O. Ackerley in his address at a meeting on December 10. In Bristol, though operations were started later, good progress is likewise being recorded. Arrangements are being made for a meeting in the New Year, when it is hoped that an address by the President will be forthcoming. We understand that, in the meantime, the President has already made arrangements to pay a visit to Newcastle (January 8), where the newly formed group is going strong, and to Leicester (January 21), where yet another group is in process of formation.

Contrasts in the Black Out

Recent demonstrations of the visibility of objects under 0.0002 ft.c. and, in particular, the dictum that light and, if possible, white garments always give rise to greater visibility than dark ones, have excited some discussion. The rather surprising discovery that of two contrasts, apparently equal but in the opposite direction, i.e., white on grey and black on grey respectively, only the former survives at very weak illuminations, relates to conditions of war-time street lighting. It would possibly not apply to the same extent at 0.02 or even 0.002 ft.c. It has been remarked that under normal pre-war conditions of street lighting we have the reverse condition. Persons on the roadway are most usually seen as dark objects silhouetted against the light roadway. The trouble is that with war-time street-lighting the luminosity of the background is rarely sufficient to create any substantial impression of brightness. Our chief hope of visibility is therefore to make the foreground objects as light as possible. Naturally, a white object could not be expected to stand out against a white background of similar reflectivity, but such backgrounds are not usual in the streets. The only case, under black-out conditions, when the advantage of light material is doubtful, is when a fairly thick mist, illuminated by some degree of moonlight, exists. Even under these conditions it will be found that the background at a moderate distance, e.g., when looking across the road, is dark—the intervening, faintly luminous being usually of insufficient depth to have much effect. But it is otherwise in the case of a person crossing the road and seen by drivers of vehicles with a great depth of mist in the background. In this unusual situation dark clothing would presumably be most easily seen.

British Standards Institution

The British Standards Institution announces that, in view of the continuing expansion of the work of the Institution and the development of its relations with the Government Departments and with standardising authorities overseas, the General Council has appointed an Executive Committee under a permanent chairman.

The Executive Committee will keep all the activities of the Institution under review, and report to the General Council from time to time as may be necessary.

Mr. C. le Maistre, C.B.E., who has been connected with the movement almost since its initiation, and who for the past twenty-five years has been its chief executive officer, has been appointed full time chairman of the Executive Committee, and Mr. P. Good, C.B.E., for several years deputy director and recently joint-director, has been appointed director and secretary of the Institution.

Members of the Illuminating Engineering Society will learn with interest of the appointment of Mr. Good as director of the Institution. The Society has benefited greatly by his services as chairman of the joint committee concerned with war-time lighting problems, much of whose work has been embodied in the useful series of BS/ARP standard specifications. A glance at the handbook of the British Standards Institution, issued in July last, shows, however, what a small part these activities form of the multifarious interests of the Institution—illustrated by the indexed list of British Standards at the end of the volume.

Gauges for Measuring Low Illuminations

In response to inquiries in regard to the "gauge" for checking very low illuminations, mentioned in Mr. Dow's recent lecture before the Royal Society of Arts*, it may be recalled that this device was designed by Mr. G. E. Lambert and his associates at the National Physical Laboratory in order to satisfy the requirements of the British Standard Specification BS/ARP 30. This simple instrument, which is now being supplied by Holophane, Ltd., has three outstanding characteristics which distinguish it from other photometers, namely (1) the very low order of illumination which it is intended to check, (2) the use of a comparison surface rendered faintly luminous by the excitation through radioactive material of fluorescent zinc sulphide, and (3) its application simply as a "gauge" in order to ensure that a certain maximum illumination (or brightness) is not exceeded. Only an observation is required and no effort is made to obtain a photometric balance.

* "Light and Lighting," November, 1941, p. 162.

Forthcoming I.E.S. Meetings

Jan. 13th, 1942. Dr. J. W. T. Walsh on **Planning for Daylight** (*Sessional Meeting to be held in the Lecture Theatre of the E.L.M.A. Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.*) **2.30 p.m.**

It is proposed to devote the subsequent Sessional Meeting in London, provisionally arranged to take place on February 10th, to a discussion on Present and Future Lighting Problems. Members who have met with and solved problems of interest at the present moment, or have ideas on the solution of special problems in Post-war Reconstruction, are invited to get in touch with the Honorary Secretary.

Jan. 11th, 1942. Mr. J. N. Aldington on **Fluorescent Light Sources** (*Meeting of the I.E.S. North-Western Centre at the Manchester College of Technology, Sackville-street, Manchester.*) **2.30 p.m.**

New I.E.S. Group in Bath

At a meeting held in Bath on December 10, Mr. R. O. Ackerley delivered an address, in the course of which he conveyed an intimation that the Council had approved the formation of an I.E.S. Group in Bath. At the meeting a very representative Committee was elected, with Mr. W. C. Bowler, A.M.I.E.E., as Chairman, and Mr. R. E. Tucker as Honorary Secretary. The Group has already acquired a substantial membership, amongst whom both those with permanent local interests and those who have recently taken up residence in Bath in connection with war work were well represented. There were also present at the meeting some representatives of Bristol where, it is hoped, a Group will also be formed in the near future.

Infra-Red Radiation and Equipment

Their Application to Industrial Processes

In what follows we give a summary of the paper on the above subject read by Mr. R. Maxted at the I.E.S. meeting held at the E.L.M.A. Lighting Service Bureau, on Tuesday, December 9th, 1941

There was an excellent audience at the E.L.M.A. Lighting Service Bureau on December 9 when Mr. W. J. Jones presided and Mr. R. Maxted's paper on the above subject was read. The fact that the subject was somewhat off the beaten track was doubtless an attraction, though the author demonstrated that there is a great deal in common in the processes used for the control of heat radiation and in illuminating engineering.

In the field of radiant energy two ideas of fundamental importance have been evolved—the dependence of characteristic effects on wave-length, and the conception of a continuous electro-magnetic spectrum. Infra-red radiation is well adapted to application in connection with war-time production. Its application to the heating of materials, e.g., the baking of paint finishes, was discussed in this paper.

Radiant heating technique still depends on direct experiment rather than a knowledge of wave-length effects, the properties of metals or the physics of processes. The first part of Mr. Maxted's paper reviewed physical aspects of the problem, the second part dealt with sources of radiant energy and engineering problems involved in the design and application of equipment.

Effects of Radiation.

Radiant heating depends upon the transformation of the radiation into sensible heat within the absorbing material, and in practice no structural changes arising from direct action of radiation are involved. Absorption is, of course, essential to the utilisation of radiant energy, but absorption does not always mean transformation into heat. Thus ultra-violet energy may induce chemical changes or alter the structure of material, or, in the case of fluorescent substances, it may cause the material to re-radiate energy of a different wave-length. Nevertheless, u.-v. energy and visible energy may also be converted into heat. The outstanding characteristic of the infra-red region is that the production of heat is practically the only primary effect of the absorption of energy—though there may be secondary effects due to the desired rise of temperature in the material. Such irrelevant effects tend, however, to decrease with increasing wave-length.

Silver, gold, copper and aluminium all maintain high reflectivity in the infra-red region. Glass has extreme transparency at near infra-red and visible wave-lengths and is a suitable material for protective enclosure of sources of radiation. Degree of penetration of material is an important factor, and with many materials absorption during transmission gives the most successful results. Much work remains to be done in determining the characteristics in this respect of materials in common use. Infra-red therapeutics afford a good example of penetration. When the heating of bodily tissue is undertaken there is appreciable penetration of flesh at wave-lengths ranging from 5,000 to 15,000 A.U., which corresponds to the peak radiation of a tungsten filament at about 3,000° K. Yet the use of the far infra-red region, derived from non-luminous sources, is often recommended.

Sources of Infra-Red Radiation.

For present-day practice, concerned largely with the heating of paint and water films, etc., and iron and steel sheets, the continuous spectrum of a filament lamp can be successfully used. This is a fortunate circumstance, because the filament lamp has other outstanding advantages. Factors affecting the design of lamps for these purposes are readily illustrated by reference to the radiation characteristics of black bodies. With increasing temperature of the source the total radiation increases rapidly and more energy is radiated at all wavelengths. There is also a shift of the maximum of the distribution curve bringing a higher percentage of the total radiation into the visible and near-visible regions. When visible energy is required filament temperatures near 3,000° K. are dictated by a compromise between efficiency of light production and the life of the source. Similar economic considerations determine a source temperature near 2,500° K. for the infra-red lamp. A practical advantage of this form of radiator is the enclosed construction, which permits the operation of the filament at high temperatures, and makes it possible to obtain increased energy from a compact source. On this, efficient utilisation and the high concentrations of energy required in practical equipment essentially depend. Radiators exposed to air, such as the wire element of the domestic heater, cannot be operated at temperatures in excess of 1,200° K., and Mr. Maxted showed by diagrams the great significance of a change in temperature from 1,200° K. to 2,500° K. Moreover, with open wire elements much power is dissipated by convection, and only 40 to 50 per cent. may be converted into radiant energy, as compared with 80 to 90 per cent. in the case of infra-red lamps. It is providential that the great bulk of the radiation from filament lamps lies between the limits of efficient control set by reflecting surfaces at the shorter wavelengths and by protective cover glasses at the longer. A high utilisation factor is therefore a matter of apt equipment design.

Possible Applications.

Infra-red lamps have had widely different applications for many widely different processes in the United States. Similar spectral distributions have been applied to paint baking on a large scale, the drying of spirit lacquers and varnishes on metal foils, pencils, and various materials; the softening of thermo-plastics; the dehydration of plywood and similar materials; the drying of inks on paper, Cellophane and metals; the drying of photographic films and latex; the evaporation of water from blue prints and from the surfaces of metals; and the pre-heating of engine parts and such as engine pistons.

Paint Baking.

Paint baking is by far the most generally significant application in war-time. In the design of equipment a high utilisation factor is aimed at, and from 50 to 90 per cent. of the incident energy, depending upon colour, may be absorbed in this process. The manner of absorption is also important and much depends upon the release of heat at the most suitable point. Processes may often be greatly hastened by infra-red methods—in some cases a reduction from 60 min. to 5 or 6 min. is possible, and without the quality of enamels, etc., being lost. Such outstanding results were originally attributed to catalytic action, but it has been shown that this is not the explanation. A more usual explanation is that when a paint is said to be stoved for an hour at, say, 200 deg. F., the article is in fact placed in air having this temperature and does not itself attain this temperature at all. Temperatures quoted in radiant heating are those actually measured on the work. Paints of all classes can be more rapidly processed by infra-red treatment. It is, however, to the synthetic enamels that infra-red baking is most usually applied.

Engineering Data.

The engineering problem has four main aspects, the measurement of energy, the determination of flux density required, the design of reflectors, and the

planning of installations. Where parabolic reflectors are applied to plane surfaces installation design is relatively simple. In more complex installations calculations of flux density may be made empirically. Measurements of radiation by the aid of thermocouples were discussed and illustrated and the estimation of flux densities to give a desired temperature gradient, or to maintain various temperatures, is considered. The method of blackening receiving surfaces of heat-measuring instruments requires some study. Just as reflectors or white receiving surfaces used in photometry should be neutral as regards colour, so the heat-receiving elements should be non-selective in regard to visible and infra-red radiation. Again "diffusing" colour glasses may be needed to prevent striation and uneven heating. In practice flux densities may range between 0.5 and 10 watts per sq. in. Densities of 2 to 3 watts per sq. in. are widely used.

Operation of Tunnels

In the latter part of the paper, reflector design was discussed in some detail and the laying out of installations, and in particular the building up of tunnels for specific tasks reviewed and illustrated. Tunnels have many interesting applications and impose special problems in design. They are usually circular in section but sometimes conform to the shape of the article treated. One evident problem is the projection of flux longitudinally. In the case of work conveyed at constant speed through a tunnel it may be desirable to create a specified heat cycle by providing different flux densities over consecutive sections. Time of exposure in the tunnel can be modified by switching on or off heating elements or adjusting the speed of travel of the objects treated.

CORRESPONDENCE

"Averaging" Fluctuating Candle-power

Dear Sir,—You refer in the November issue, under "The Editor Replies," to the measurement of the average candle-power of a rapidly fluctuating light source, remarking that with a photo-electric photometer the averaging is not fully automatic. May I venture to remind you of the time-honoured method in which a photocell communicates to a condenser a charge proportional to the total incident light over a period of time, the final value of the charge being indicated by an electrometer connected across the condenser? This circuit performs the necessary intensity-time integration, and if the total time is known, the average intensity follows directly.

Nowadays one uses an electrometer triode valve instead of a quadrant electrometer, of course, and references may be found describing the use of such apparatus for measuring the light output of such things as photographic flash-bulbs in candle-seconds or lumen-seconds. The time-durations permissible depend on the natural leaks in the circuit, but these may often be allowed for, as in the similar use of the circuit for measurement of ionisation currents. Integration over periods of the order of an hour are not impossible, directly. while certian American workers have devised a circuit for metering out the photocell output in equal units of electric charge and counting them automatically, so providing for continuous operation over any period of time.

Yours truly,
J. S. Preston.

A Group for Technical Optics

We learn that the Council of the Physical Society, which has been so successful in forming the Colour Group, is now proposing the formation of a similar group to deal with Technical Optics. For the time being, however, activities will be concentrated on instrumental optics (i.e., optical instruments, optical glass processes of instrument manufacture, etc.). A meeting to discuss the matter was convened at the Imperial College on December 17. Those interested should communicate with Mr. L. C. Martin, 1, Lowther-gardens, Exhibition-road, South Kensington, London, S.W.7.

A Simple Side-Lamp Photometer

by

F. M. HALE, B.Sc., F.I.E.S.

To those who have reason to journey in the black-out, the thought must have often occurred that considerable diversity exists in the brightness of motor-car side-lamps, some being very conspicuous at considerable distances, others dangerously dim. In fact, all too often they fail to comply with the requirements of the regulations which call for fulfilment of the following conditions (S.R. & O., 1940, No. 74, para. 14, amended by S.R. & O., 1940, No. 1,872, para. 2):—

> An authorised side-lamp is a lamp of a power not exceeding 7 watts, emitting a white light to the front of the vehicle and satisfying the following conditions:
>
> (a) That the light is emitted through a single circular aperture of 1 inch in diameter, and
>
> (b) That the light emitted is clearly visible at a distance of 30 yards but is not visible at a distance of 300 yards.

Unlike a headlamp, the use of which is not obligatory (though almost a necessity in the black-out), side-lamps and a rear lamp must be carried by all vehicles using the public roads after dark. The use of side-lamps is to reveal the presence and width of the vehicle; they are not intended as an aid to driving. It follows, therefore, that under black-out conditions a minimum prescribed brightness is essential if sufficient warning is to be given to other drivers and pedestrians in the vicinity. At the same time, any maximum permitted brightness must be such that the side-lamp is invisible beyond a certain distance, so that there can be no risk of its being seen by observers flying in enemy aircraft.

These considerations led to the adoption in the regulations of the distances of 30 yards at which the lamp must be clearly visible and of 300 yards at which it must be invisible. Such a definition for the brightness limits certainly provides a ready means of checking for conformity with the regulations without the use of an instrument—a distinct advantage for the average motorist or police constable. On the other hand, some definite disadvantages are associated with this method. Perhaps the foremost of these is the disagreement among observers as to the distance beyond which the lamp is invisible, due to differences in observers' eyes and to the extent of dark adaptation. Moreover, slight haze in the atmosphere, not readily noticed under normal conditions, may well invalidate any observations where the disappearance of a source, only 1 in. in diameter, is being investigated. A more practical disadvantage is the fact that the test may well involve a walk of 600 yards or more, itself sufficient to deter many motorists from checking their lights!

Arising from these considerations the author, who has been responsible for ensuring correct side-lamp brightness of a fleet of vehicles, made a series of observations to correlate distance of invisibility with measured brightness of a side-lamp reduced by a 1 in. diameter aperture as prescribed. From these it was found that under clear atmospheric conditions a side-lamp, having a brightness of about 0.8 e.f.c., becomes invisible to an average observer at the regulation distance of 300 yards. Owing to the nature of the test this value of brightness must be considered very approximate, though it does indicate the order of the maximum brightness permitted. This upper limit having thus been found by experiment, it was decided to develop a small portable photometer covering the range involved by which the brightness of side-lamps could be measured.

The final form of the instrument is shown in the diagram (Fig. 1). In use it is held horizontally so that the end of the rotating head and the side-lamp under observation are side by side. The rotating head carries a circular diffusing test disc, 1 in. in diameter, which corresponds with that of a regulation side-lamp. This head is capable of being turned relative to the body of the instrument, which results in an increase or decrease in brightness of the test disc, according to the direction of rotation. Brightness of the test disc is read on a circumferential scale, graduated in e.f.c., and carried on the body of the instrument.

To make a comparison, the rotating head is turned until the brightness of the test disc appears the same as that of the side-lamp under examination. The brightness of the test disc corresponding to this setting is then read off directly on the scale. The method has the advantage that, once the initial calibration of the instrument is carried out, all subsequent settings can be read directly in equivalent foot-candles or any other convenient unit of brightness, thus dispensing with the need for a test plate involving a correction for reflection factor. Furthermore, as the comparison uses binocular vision, reasonably accurate settings can be made by inexperienced observers.

The instrument, which was made up of sheet tinplate, consists essentially of three main parts: (A) a detachable end, on which is mounted a batten M.E.S. lampholder; (B) a cylindrical body carrying the fixed circumferential scale; and (C) the rotating head, in which is embodied the test disc. The construction of the rotating head will readily be understood from the diagram. It takes the form of a deep lid which rotates easily over the end of the cylindrical body. A circular aperture, 1 in. in diameter, backed by a piece of pot opal glass, is carried in the centre of this lid (D). To this lid is fitted a small cylinder, in the other end of which is cut a semi-circular aperture shaped as shown (E). Disc (F) is affixed to this end of the cylinder by means of a central pin axially mounted so that one can rotate relative to the other. A semi-circular aperture is also cut in this disc and it, too, is backed by a disc of flashed opal glass. A small slot is cut in the circumference of the disc and this, in conjunction with a check inside the body of the instrument, prevents the disc turning when the head

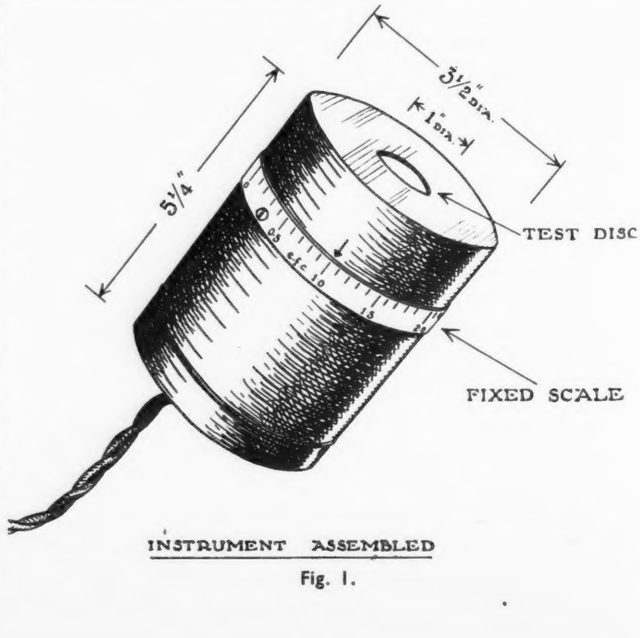

Fig. 1.

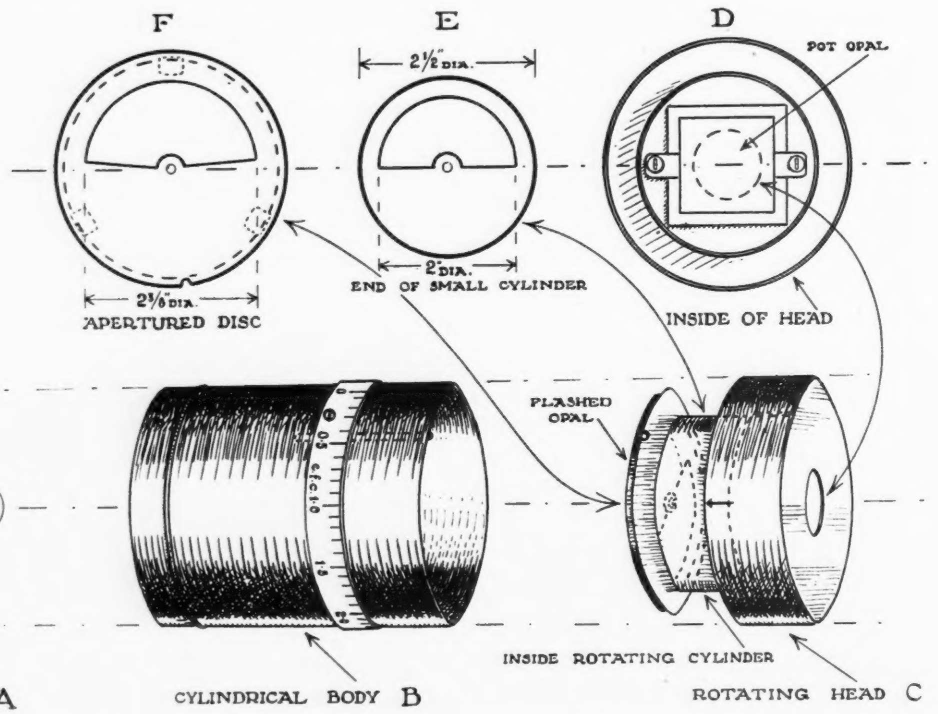

Fig. 2.
Showing the individual parts of instrument.

carrying the small cylinder is rotated. Thus, in the assembled instrument, a rotation of the head varies the effective aperture through which light from the lamp chamber, diffused by the opal disc, enters the small cylinder. This in turn affects the brightness of the diffusing test disc in the head. All inside surfaces upon which light falls are painted matt white so that uniformity of brightness across the test disc is assured. The deep lid forming part of the rotating head carries an index which serves to indicate the reading on the scale and the full brightness range is covered by a rotation of approximately 180°. In the final form of the instrument the angle between the radii bounding the " semi-circular " aperture in disc (F) was made about 5° less than 180°. This ensured complete light extinction through this small angular rotation. A small stop is provided to prevent the head being turned past the zero and maximum brightness settings.

The instrument was calibrated using a visual illumination photometer to measure the test-disc brightness for a series of settings on the rotating head. From these readings a calibration curve was drawn, and this curve was used to construct the brightness scale.

The instrument described was designed to cover the range 0—2.0 e.f.c. using a 4v. 0.4A lamp. While no special provision was made to extend the range, this could be done without difficulty by fitting a lamp of higher wattage. Alternatively, the circle of flashed opal glass backing disc (F) could be replaced by one of higher transmission. To reduce the range, a converse procedure might be adopted; while the fitting of a suitable detachable neutral screen over the test-disc may be found desirable in some circumstances.

No special control panel was made up, since it was found possible to maintain the lamp at 3.5 volts, the calibration value, using an accumulator and panel from another illumination photometer. Where such a unit is not available, however, the usual constant voltage or current control has to be provided. In this connection, consideration might well be given to modifying the instrument to house a side lamp bulb and to using the battery of the vehicle as the source of energy.

A Recording Illumination Photometer

In our last issue* allusion was made to several special problems in photometry, some of which may be solved by the use of light sensitive cells. With one of these problems, the integration of rapidly varying light impulses, Mr. Preston deals on p. 173. Another requirement, the automatic recording of fluctuating candle-power, is met by the instrument shown in the accompanying illustration, which figures in a recent list of photometric instruments, issued by Messrs. Everett Edgcumbe, Ltd. The apparatus uses

A view of the "Autophotic" Recording Photometer. The apparatus may be either portable or suitable for mounting on a wall. It carries a chart 65 ft. long which, when operated at 1 in. per hour, will give a permanent record over a period of one month.

a sensitive test-surface embodying an " autophotic " cell in conjunction with a recording instrument, the marking being effected by the pressure of the pointer on an inking ribbon inserted between the pointer and the chart. In this way a permanent record of the illumination derived from either daylight or artificial light can be obtained. The apparatus has been used with good effect by a Corporation Power Station, who wished to record the average illumination between two points a few miles apart. This was readily done by inserting a cell at each point, and it was thus possible not only to give warning of the approach of a fog but to limit the warning to cases in which both test points were affected.

* " Light and Lighting," Nov., 1941, p. 164.

Literature on Lighting

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from page 166, November, 1941)

I.—SOURCES OF LIGHT.

244. Relative Cost of Industrial Light Sources.

C. C. Mills. El. World, 116, p. 885, Sept. 20, 1941.

The author reviews the cost of lighting industrial premises with plain incandescent filament, mercury vapour, mixed incandescent filament and mercury vapour, and white fluorescent mercury vapour lamps, for varying levels of illumination and for different mounting heights. His main conclusion is that for low energy rates incandescent lamp lighting is most economical, but the mercury system is very economical for giving high illumination levels at average mounting heights with energy costs about 1 cent per kW. hour. Initial and operating costs are considered, and interesting conclusions are drawn. S. S. B.

II.—LIGHTING EQUIPMENT.

245. Ultra-Violet Reflectance Characteristics of Various Materials.

A. H. Taylor. Am. Illum. Eng. Soc. Trans., pp. 927-930, No. 9, Nov. 1941.

Reflection data for a number of metals and some aluminium paints are presented. Figures are given for light, of colour temperature 2850 K, and for ultra-violet radiation at wavelengths 2652 A.U., 2967 A.U., and 3663 A.U. J. S. S.

246. Finishes Designed for Infra-Red.

David Donovan. El. World, 116, p. 727, Sept. 6, 1941.

The author discusses briefly the use of "war infra-red" radiant heat for baking industrial finishes, and points out the factors which have to be taken into consideration in planning a scheme. Some typical schedules are quoted, and reference is made to the many finishes which are now available and which have been specially formulated for "infra-red" baking. S. S. B.

III.—APPLICATIONS OF LIGHT.

247. Light and Architecture.

Anon. Am. Illum. Eng. Soc. Trans, pp. 891-896, No. 9, Nov., 1941.

Some representative architectural schemes are described with photographs. J. S S.

248. Glare and Lighting Design.

F. W. Fowler and C. L. Crouch. Am. Illum. Eng. Soc. Trans., pp. 897-916, No. 9, Nov., 1941.

The paper studies and compares the results of work on direct glare by a number of investigators, and suggests applications to the design of lighting equipment. J. S. S.

249. Continuous Row Lighting.

W. C. Brown. Magazine of Light, X., No. 5, pp. 20-22, and pp. 34-35, July, 1941.

The merits of continuous-row lighting with tubular fluorescent lamps are discussed, with particular attention to economics. Numerous illustrations of such installations are given. C. A. M.

250. A Fluorescent-lighted Paint Spray Booth.

Anon. El. World, 116, p. 916, Sept. 20, 1941.

A description is given of the lighting of a large spray booth by means of tubular fluorescent lamps. Details are given of the installation and of the illumination values obtained. S. S. B.

251. How to Apply New Street-lighting Code.

F. Victor Westermaier. El. World, 116, p. 217, July 26. 1941.

Details are given of the latest American street-lighting code, with an explanation of its use and method of application. S. S. B.

252. Tunnel Lighting.

Anon. Elect., 127, p. 305. November 28, 1941.

Details with a photograph are given of the lighting of the Queen's Midtown Tunnel, New York. The main lighting is produced by two independent circuits, one with 100-W and the other with 150-W general service lamps. Three illumination values are thus possible, the maximum being about 7 ft.c. Additional equipment at the entrances reduces the contrast between interior and exterior illumination values. C. A. M.

253. Lighting Road Tunnels.

Anon. Elect., 127, pp. 279-280. November 14, 1941.

A description is given of the lighting of seven miles of tunnelling that forms part of the Pennsylvania Turnpike. Mercury lamps of 250-watt rating are installed in two rows in open-type fittings in the ceiling at a spacing height ratio of about 2.5 to 1. C. A. M.

254. Mercury Vapour Lamps Light Turnpike Tunnels.

L. A. S. Wood. El. World, 116, p. 880. September 20, 1941.

A total length of seven miles of tunnels are lighted on the Pennsylvania Turnpike. Sodium vapour lamps are used for the approaches to the tunnels and at road junctions with the highway (as indications of necessary caution), but mercury vapour lamps are used inside the tunnels in recessed open reflectors. A level of 6 ft.c. is maintained, increased to 30 ft.c. near the tunnel mouth, to assist adaptation of the eye of the driver. Full details of the scheme are given. S. S. B.

255. Sodium Illumination for Vehicular Traffic Tunnels.

R. M. Swetland. Am. Illum. Eng. Soc. Trans, pp. 917-926, No. 9. November, 1941.

Lighting equipment, using sodium lamps, and the associated circuits are described. Existing installations using such equipment in tunnels are discussed. J. S. S.

256. Anti-Sabotage Flood Reduces Fence Glare.

Anon. El. World, 116, p. 922. September 20, 1941.

Full details are given of a floodlight (intended primarily for protective lighting of enclosed areas), which utilises a Fresnel type lens to give a fan-shaped beam of 180° spread and 15° vertical thickness. An intensity of not less than 7,000 candles with a 300-watt lamp is maintained over 120°. S. S. B.

257. Height of Clouds Measured in Daylight with Mercury Lamps.

Anon. Am. Illum. Eng. Soc. Trans., p. 887, No. 9. November, 1941.

A method used by the National Bureau of Standards to determine the height of clouds is described. The beam from a 24" searchlight mirror equipped with a 1,000-W water-cooled mercury lamp is directed upon the cloud, and the light reflected is detected by a photoelectric receptor. It is claimed that on overcast days clouds at 9,000 ft. can be detected, and cumulus clouds illuminated by sunlight at 4,000 ft. The height is calculated by triangulation. J. S. S.

A view of the Closing Room in Messrs. Geo. Webb & Sons Mentone Shoe Works, Northampton, in which 400 Mazda 60W. 60-in. fluorescent lamps, housed in Mazdalux reflectors have been installed. In this department fittings are spaced 2 ft. 9 in. apart and 4 ft. high, and an average illumination of 25-30 ft.c. is provided.

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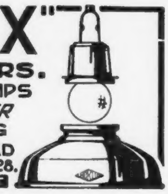

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Also for A.R.P. Shelters and tunnels.

INDEX TO "WHERE TO BUY"

N.B.—The numbers are those attached to individual entries in the Directory *(See pp. 179—180)*

Doctors Visit the E.L.M.A. Lighting Service Bureau

A party of medical men, who are undertaking a course of instruction at the Royal Institute of Public Health and Hygiene, recently visited the E.L.M.A. Lighting Service Bureau, where an address was given by Mr. E. B. Sawyer. It is common knowledge that medical officers of health have to deal with a great variety of problems. Schools, factories, domestic premises, shops, and public buildings, all come under their jurisdiction, so that their potential influence in favour of better lighting is very considerable. Mr. Sawyer laid stress on the importance of natural and artificial light in relation to vision, and quoted the reports of the Industrial Health Research Board, the Departmental Committee on Lighting in Factories, and other authorities in order to illustrate their influence on production. In this connection he drew attention to the serious effect of undetected physical defects amongst industrial workers in slowing up productive power. Mr. Sawyer concluded by expressing the hope that the audience would do everything in their power to improve the conditions in the smaller factories where lighting is in general much below the standard laid down by the Ministry of Labour and National Service.


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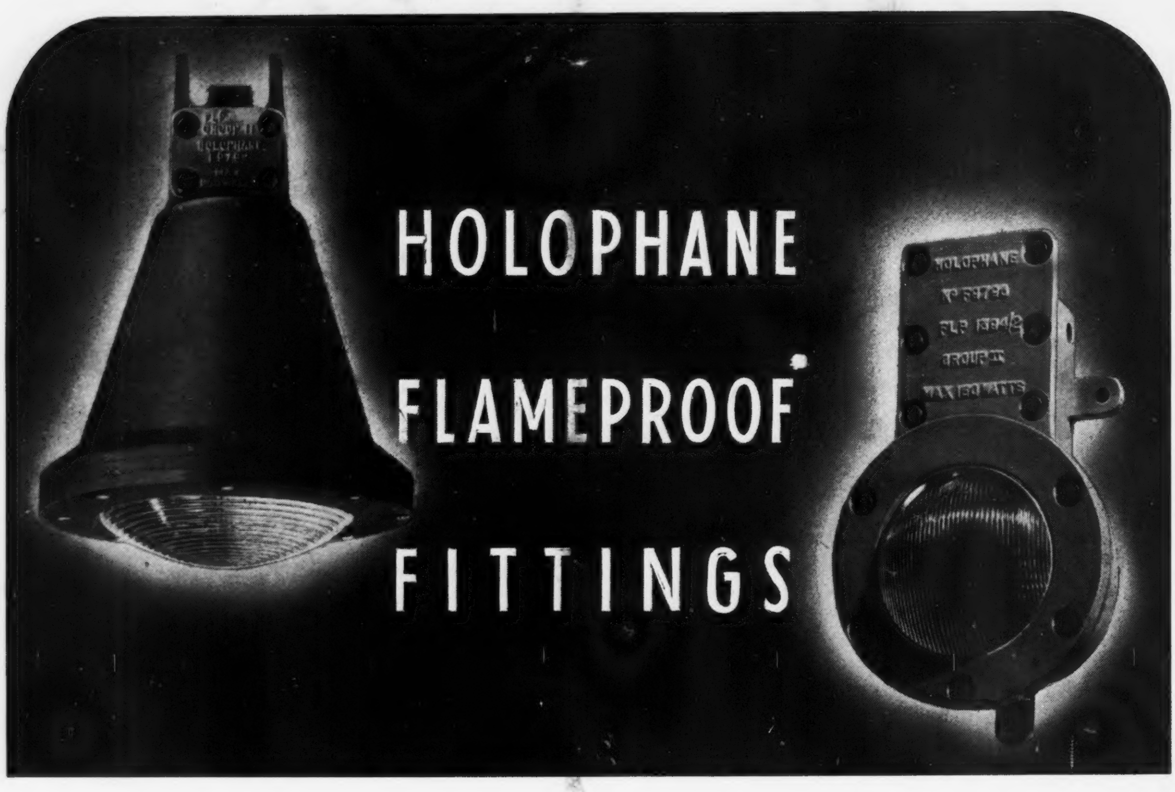

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